We Claim:

1. A method comprising:

receiving a first packet of information on an input optical signal that occupies a plurality of input channels, each input channel being included in one among an input plurality of distinct wavelength ranges; and

transmitting the first packet of information on an output optical signal that occupies a plurality of output channels, each output channel being included in one among an output plurality of distinct wavelength ranges,

wherein the plurality of input channels includes:

(A) a reserved wavelength buffer; and

(B) a channel on which the first packet is received,

wherein the plurality of output channels includes an active wavelength buffer on which the first packet is transmitted, and

wherein each among the input plurality of wavelength ranges is associated, in order of increasing wavelength, with one among the output plurality of wavelength ranges in order of increasing wavelength, the wavelength range including the reserved wavelength buffer being associated with the wavelength range including the active wavelength buffer.

2. A method as in claim 1 further comprising:

transmitting, prior to the receiving, information including the first packet on the input optical signal, the transmitting including reserving the reserved wavelength buffer.

3. A method as in claim 1, further comprising receiving an additional input optical signal having a second packet of information wherein the second packet of

information is carried within the additional input optical signal over substantially the channel on which the first packet is received.

4. A method as in claim 1, further comprising:

prior to transmitting the first packet of information on the output optical signal, extracting label information from the input optical signal, the label information including information about the first packet of information;

generating a control signal according to at least a portion of the label information;

controlling a signal-producing component to reproduce the first packet of information within the output optical signal in the active wavelength buffer; and

re-associating the label information with the first packet of information.

5. A method as in claim 4, wherein the label information is carried within the input signal in a channel distinct from the first input channel and distinct from the reserved wavelength buffer and within the output signal in a channel distinct from the active wavelength buffer.

6. A method as in claim 4, wherein the signal-producing component comprises:

a local oscillator controlled by the control signal to produce a local oscillator signal,

a modulator, accepting as one input, the local oscillator signal, and as another input, a signal representing the first packet of information, the modulator further producing as an output, a modulated output signal including the first packet of information.

7. A method as in claim 6, wherein a frequency of the local oscillator signal corresponds to a difference in frequency between the channel on which the first packet is received and the active wavelength buffer.

8. A method as in claim 6, wherein the modulator is a Mach-Zender modulator.

9. A method as in claim 4, wherein the signal-producing component comprises:

a laser, controlled according to the control signal to produce a laser signal, and

a semiconductor optical amplifier, accepting as one input the laser signal, and as another input a signal representing the first packet of information, the semiconductor optical amplifier further producing as an output, a modulated output signal including the first packet of information.

10. A method as in claim 9, wherein the laser signal has a frequency which corresponds to a difference in frequency between the channel on which the first packet is received and the active wavelength buffer.

11. A method as in claim 1, further comprising:

extracting label information, the first packet of information, and a carrier from the input optical signal;

producing a first electronic signal representing information from the first packet of information; and

producing a second electronic signal representing the label information,

wherein transmitting the first packet of information further comprises modulating the carrier with the first and second electronic signals to produce the output optical signal.

12. A method as in claim 1, further comprising:

extracting label information and the first packet of information from the input optical signal;

producing a first electronic signal representing information from the first packet of information;

producing a second electronic signal representing the label information; and

controlling a first and second laser diode according to the first and second electronic signals, respectively, to produce the output optical signal.

13. A device comprising:

an optical receiver, the optical receiver configured and arranged to receive a first packet of information on an input optical signal that occupies a plurality of input channels, each input channel being included in one among an input plurality of wavelength ranges; and

an optical transmitter, the optical transmitter being configured and arranged to transmit an output optical signal that occupies a plurality of output channels, each output channel being included in one among an output plurality of wavelength ranges,

wherein the plurality of input channels includes:

(A) a reserved wavelength buffer; and

(B) a channel on which the first packet is received,

wherein the plurality of output channels includes an active wavelength buffer on which the first packet is transmitted, and

wherein each among the input range of wavelength portions is associated, in order of increasing wavelength, with one among the output plurality of wavelength ranges in order of

increasing wavelength, the wavelength range occupied by the reserved wavelength buffer being associated with the wavelength range occupied by the active wavelength buffer.

14. A device as in claim 13, wherein the optical receiver is further configured and arranged to receive an additional input optical signal having a second packet of information wherein the second packet of information is carried within the second input optical signal over substantially the channel on which the first packet is received.

15. A device as in claim 13, further comprising:

a label reader, configured and arranged to, prior to the transmitting of the output optical signal, extract label information from the input optical signal, the label information including information about the first packet of information;

a control signal generator, configured and arranged to generate a control signal according to at least a portion of the label information;

a signal-producing component, configured and arranged to reproduce the first packet of information within the output optical signal in the active wavelength buffer; and

a labeling component, configured and arranged to associate the label information with the first packet of information.

16. A device as in claim 13, wherein the signal-producing component comprises:

a local oscillator controlled by the control signal to produce a local oscillator signal,

a modulator, accepting as one input, the local oscillator signal, and as another input, a signal representing the first packet of information, the modulator further producing as an output, a modulated output signal including the first packet of information.

17. A device as in claim 16, wherein a frequency of the local oscillator signal corresponds to a difference in frequency between the channel on which the first packet is received and the active wavelength buffer.

18. A device as in claim 16, wherein the modulator is a Mach-Zender modulator.

19. A device as in claim 15, wherein the signal-producing component comprises:

a laser, controlled according to the control signal to produce a laser signal, and

a semiconductor optical amplifier, accepting as one input the laser signal, and as another input a signal representing the first packet of information, the semiconductor optical amplifier further producing as an output, a modulated output signal including the first packet of information.

20. A device as in claim 19, wherein the laser signal has a frequency which corresponds to a difference in frequency between the channel on which the first packet is received and the active wavelength buffer.

21. A device as in claim 13, wherein the input optical signal includes a carrier signal and label information, the device further comprising:

at least one filter, configured and arranged to extract the carrier signal from the input optical signal;

a label reader, configured and arranged to extract label information from the input optical signal;

a label writer, configured and arranged to produce a first electronic signal representing the extracted label information;

a signal regenerator, configured and arranged to produce a second electronic signal representing the first packet of information; and

a modulator configured and arranged to modulate the carrier with the first and second electronic signals to produce the output optical signal.

22. A device as in claim 13, further comprising:

a label writer, configured and arranged to produce a first electronic signal representing the label information;

a signal regenerator, configured and arranged to produce a second electronic signal representing the first packet of information; and

a first and second laser diode, controlled according to the first and second electronic signals, respectively, to produce the output optical signal.

23. A method of transmitting a signal, comprising:

receiving a broadband input optical signal including a payload and label information;

receiving the label information with a baseband optical receiver;

modifying the label information to produce modified label information; and

re-combining the modified label information with the payload to produce an output optical signal including the payload and the modified label information.

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